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Dear Dan:

As you know, we have had underway the last few months a continuous program directed at solving the remaining engineering problems and obtaining peak performance from the data-reduction equipment for both the 3-channel and 14-channel systems. We have had frequent visits, guidance, and counsel from Jim S. during this period. Some of these problems have developed in the operation of completed units during final check out. Other problems have developed from the attempted operational use of the equipment with actual data input.

We have sought throughout the data-reduction program to get maximum performance from the equipment so that as much as possible of the basic information originally obtained could be preserved throughout the analysis operation. We are seeking to obtain the maximum possible signal-to-noise ratio in the equipment under quite a wide range of operating conditions. We want to maintain a wide dynamic range with substantially varied input conditions. Recording heads with different characteristics, and tape speed variations from 2-1/4 to 60 inches per second are used in different parts of the system and under different operating circumstances.

In part, the necessity of meeting these varied input requirements has developed from the operational results and increased experience in dealing with the recorded data. While, ideally, we would like to anticipate all the problems in our original design and development work, it has not been possible to do so because the data-reduction program had to be implemented in close timing with the data gathering equipment with the result that much of the systems engineering was done before any actual operating data was available. The extremely high sensitivity requirement for the data-reduction equipment was not fully appreciated until we were actually faced, in an operating sense, with obtaining the maximum information from recordings. The push for maximum sensitivity has necessitated redesign to reduce hum pick-up, distortion, and cross-talk between channels.

Only by establishing a continuing engineering program has it been possible to meet and solve these problems which have developed during the course of the project. As a result, there has been substantial added engineering work not contemplated in the original development program. The accompanying proposals set this forth in some detail for the 3-channel and 14-channel programs separately.

Thermo ... made & sent [redacted] 25X1A

10/14/57
25X1A [redacted]

[redacted] ...tains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18 U.S.C., Section 793 and 794. Its transmission or the revelation of its contents in any ... law.

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The estimated cost of the additional 3-channel engineering work is 25X1A [redacted] and the total estimated 25X1A cost, including fee, is [redacted] For the additional 14-channel engi- 25X1A neering work, the estimated cost is [redacted] the fixed fee is 25X1A [redacted] and the total estimated cost, including fee, is [redacted] 25X1A A part of the work on both programs was performed by the Electronic Instrumentation Division and a part by the Communications Division. The labor and burden rates for these two cost centers vary somewhat. We have attempted to estimate the proportional split of the work between the two divisions, and a separate estimate is shown for each division.

In retrospect, we probably pushed into the production phase of this equipment too early. The number of engineering problems unresolved when the production program was begun have subsequently necessitated redesign and modification of a substantial amount of completed-production work. Yet, on the kind of schedule we established, and believed necessary, there was no way to avoid rework costs on completed-production work when engineering changes were found to be necessary later on. For these reasons, substantial added production work has been performed to modify, change, and rework 3-channel units already fabricated. The details of this added work are set forth in an accompanying proposal. The estimated cost of the rework and new construction is [redacted]; the fixed fee on 25X1A 25X1A this amount computed at [redacted] and the total estimated cost, 25X1A including fee, is [redacted] A substantial portion of this work was performed by the Electronic Instrumentation Division; the Communications Division performed the remainder.

Since the 14-channel equipment had not been put into production before most of these engineering changes were made very little rework was required on those racks. However, the redesign of the record and playback amplifier which is also used in the G rack coupled with the necessary redesign of the mounting chassis unit has substantially increased the estimated cost for production of this rack. A revised cost estimate is included for the G rack. No changes have been made in the estimated production costs of H, J, and K units, although some minor revisions were made in these racks. The estimated cost for five G racks as redesigned 25X1A is [redacted] the fixed fee on this amount at [redacted] 25X1A

Additional funding was added to the contract in Amendments 11 and 13 in anticipation of this added work. Based on the funding through Amendment 13 of the contract, this added work will require an increase in the present funding on a cost basis, for the 3-channel development work of

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25X1A [redacted] and for the 3-channel production work of [redacted] The 25X1A
funding on a cost basis for the 14-channel development work needs to be
25X1A increased by [redacted] and the production of the first five G racks by
25X1A [redacted] 10.

These changes will also serve to increase the production cost of certain of the racks for the additional quantities authorized in your letter No. 18736 dated 23 August 1957. We are re-estimating the production costs for the additional quantities of the various racks to be built and will advise you shortly, by separate letter, of the anticipated changes. It is probable that these will not be large except in the case of the G rack.

These additional engineering changes will substantially change the spares list previously forwarded and approved. Operating experience to date has also indicated the desirability of making certain changes in spares provisioning. We are currently revising the required spares list for data-reduction racks and expect to forward revised lists for your approval in two or three weeks. We have of course modified our procurement and fabrication of these spares wherever possible to conform with engineering changes as they were made. It is probable that the cost of spares will be reduced somewhat.

We regret that the work necessary on the data-reduction equipment program has proven to be substantially more costly than was originally estimated. In retrospect, it appears highly probable that more careful and detailed planning during the earliest stages of the program could have resulted in lower over-all costs. However, the data reduction equipment was the last to receive consideration in the over-all program, and a very heavy attempt was made to complete engineering and commence delivery of a number of equipment units on a time scale which completely prohibited a study of the over-all program requirements. In consequence, additions to the program and changes in concept occurred with considerable frequency, and led to substantial re-engineering of major equipment items during various portions of the program. It was required that the equipment be of such design as to permit a high order of automaticity in operation without significant loss of the intelligence being processed. This requirement has led to a substantially higher order of equipment complexity than might otherwise have been required, and to a correspondingly higher cost in both equipment engineering and production. The various forms and degrees of compensation for signal distortion provided in the present equipment, together with the requirements placed on suppression of system noise, have led to equipment exceeding the normal performance of otherwise comparable equipment to a pronounced degree.

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Although the engineering difficulties encountered in the development of the data-reduction equipment were quite formidable, we believe that satisfactory solutions to all of the major problems have been developed and that the equipment in its present form, with relatively few exceptions, provides a capability compatible with all major needs of the program.

Sincerely,

Dean

Enclosures:

Copies 1-3 of 5 of the
following CMCC Doc. Nos.
1131X5.115
1132X5.153
1132X5.154
1131X5.116
1132X5.155
1132X5.156
1131X5.114
1132X5.151
1132X5.152
1132X5.157

cc: H. A. W. - AGO
Copy 4 of the above
listed documents.